ONTARIO MINISTRY OF ENVIRONMENT
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OPERATING SUMMARY

CHATHAM

water pollution control plant

1968

TD
367
.A56
C44
1968
MOE

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

TD
367
.A56
C44
1968

Chatham : water pollution
control plant.
81276

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 7
Ontario

We are pleased to present you with the Operating Summary for the water pollution control facilities operated for you during 1968.

Both the financial and technical information presented should be of assistance to your present and future planning in this important phase of municipal activity.

A new format has been devised to allow greater readability with equally detailed content. We trust that this will meet with your approval.

Our staff wish to express their appreciation for your co-operation throughout the year.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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ONTARIO WATER
RESOURCES COMMISSION

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CHATHAM

water pollution control plant

operated for

THE CITY OF CHATHAM

by the

ONTARIO WATER RESOURCES COMMISSION

1968 ANNUAL OPERATING SUMMARY

Environment Ontario
Laboratory Library
Etobicoke, Ontario

FOREWORD

● This operating summary outlines the project's technical capabilities and financial status in 1968. Such information mirrors past and present performance, but a major intention is to anticipate the future -- to solve problems before they occur.

The new format in which this year's data are presented is designed to offer a higher level of readability than in the past, without a corresponding decrease in compactness, accuracy and detail.

Although your Regional Operations Engineer carries the major responsibility for the contents of the report, those involved in its preparation are attached to several Commission sections and divisions. The statistics section of the Division of Plant Operations compiled the information for the graphs and charts. The draughting section of the Division of Sanitary Engineering drew the graphs. The Division of Finance provided all cost data.

Only the close co-operation of these departments allowed the publication of this summary.

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'68 REVIEW

This report gives in detail significant data on the operation of various treatment units at the Chatham Water Pollution Control Plant during its third year of operation.

The operating cost for the year was $137,296.11 for a cost of $99.46 per million gallons or four cents per pound of BOD removed. The cost per million gallons is $8.47 less than in 1967.

The average treated flow of 3.80 mgd, was 84% of the design capacity. During the peak month of September, the average daily flow was 4.57 mgd or slightly greater than 100% of design.

A raw sewage having an average strength of 250 mg/l BOD and 234 mg/l suspended solids was treated. Good percentage removals of BOD and suspended solids were obtained. A total of 3.120 million lbs. of BOD and 2.042 million lbs. of suspended solids was removed. A total of 8.65 million gallons of raw sludge was treated in the digesters, and most of the digested sludge was disposed of by tank truck. Some sludge was disposed of on the plant grounds. Proper chlorination of the final effluent was maintained all year.

Construction was completed on two cells of a six-cell aerated lagoon system to treat the seasonal wastes from the city's canning industries. The cells performed well. Construction of a storage shed was completed during the year.

PROJECT COSTS

STAGE I

NET CAPITAL COST (Final)	$2,615,831.27
DEDUCT - Portion Financed by CMHC-MDLB (Final)	1,845,135.13
Long Term Debt to OWRC	$ 770,696.14
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 65,479.32
Net Operating	$ 137,296.11
Debt Retirement	15,553.00
Reserve	6,601.20
Interest Charged	43,332.40
TOTAL	$ 202,782.71

RESERVE ACCOUNT

Balance at January 1, 1968	$ 22,806.38
Deposited by Municipality	6,601.20
Interest Earned	1,461.35
	$ 30,868.93
Less Expenditures	7,063.01
Balance at December 31, 1968	$ 23,805.92

STAGE II

NET CAPITAL COST (Estimated)	$814,322.12
DEDUCT - Portion Financed by CMHC-MDLB (Estimated)	504,317.16
Long Term Debt to OWRC	$310,004.96
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 18,452.91
Net Operating	$ -
Debt Retirement	6,256.00
Reserve	2,881.19
Interest Charged	17,348.61
TOTAL	$ 26,485.80

RESERVE ACCOUNT

Balance at January 1, 1968	$ 5,619.79
Deposited by Municipality	2,881.19
Interest Earned	399.02
	$ 8,900.00
Less Expenditures	-
Balance at December 31, 1968	$ 8,900.00

STAGE III

NET CAPITAL COST (Final)	$1,079,015.80
DEDUCT - Portion Financed by CMHC-MDLB (Final)	733,301.54
Long Term Debt to OWRC	$ 345,714.26
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 16,671.07
Net Operating	$ -
Debt Retirement	6,987.00
Reserve	2,203.20
Interest Charged	19,196.54
TOTAL	$ 28,386.74

RESERVE ACCOUNT

Balance at January 1, 1968	$ 2,300.80
Deposited by Municipality	2,203.20
Interest Earned	187.26
	$ 4,691.26
Less Expenditures	-
Balance at December 31, 1968	$ 4,691.26

STAGE IV

NET CAPITAL COST (Estimated)	$600,605.66
DEDUCT - Portion Financed by CMHC-MDLB (Estimated)	357,876.24
Long Term Debt to OWRC	$242,729.42
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1968	$ 3,880.04
Net Operating	$ -
Debt Retirement	3,794.00
Reserve	3,698.00
Interest Charged	9,347.32
TOTAL	$ 16,839.32

RESERVE ACCOUNT

Balance at January 1, 1968	$ -
	3,698.00
Deposited by Municipality	83.58
Interest Earned	
	$ 3,781.58
Less Expenditures	-
Balance at December 31, 1968	$ 3,781.58

RESERVE FUND FOR PUMPING STATIONS OPERATED UNDER SPECIAL OPERATING AGREEMENT

BILLINGS

Reserve	$360.00

RESERVE ACCOUNT

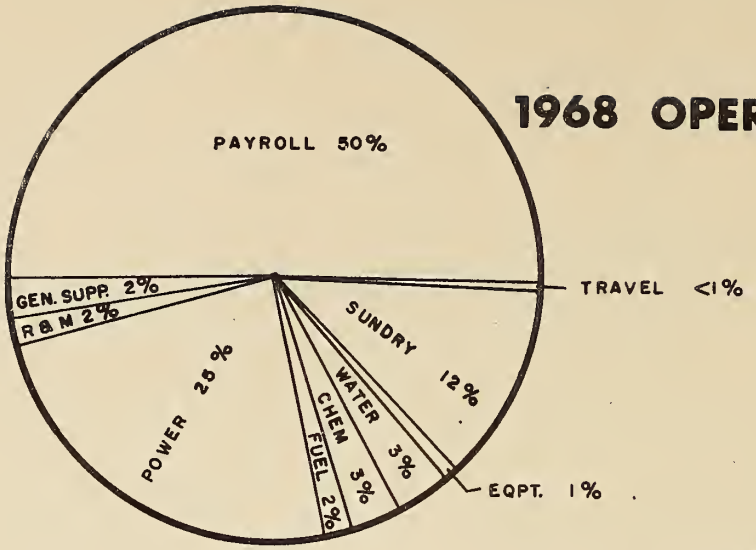
Balance at January 1, 1968	$367.80
Deposited by Municipality	360.00
Interest Earned	30.29
	$758.09
Less Expenditures	-
Balance at December 31, 1968	$758.09

Monthly Operating Costs

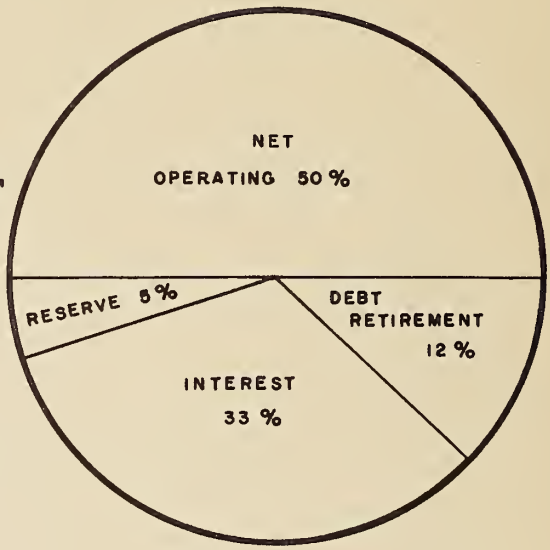
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	* SUNDRY	WATER	TRAVEL
JAN	5912.15	4834.63	-	236.73	152.63	-	53.90	120.46	56.59	99.44	357.77	-
FEB	8709.59	4738.85	-	347.31	2861.73	-	475.09	28.08	216.53	42.00	-	-
MAR	15006.70	7855.28	-	401.65	2737.65	-	204.45	78.65	102.34	2941.73	684.95	-
APRIL	8673.82	4769.04	-	87.92	2615.48	-	299.22	-	-	902.16	-	-
MAY	10525.87	4765.65	-	148.39	2454.05	2131.50	177.27	-	312.65	199.44	336.92	-
JUNE	10426.42	4765.65	-	130.83	2586.72	-	228.29	-	533.99	2180.94	-	-
JULY	11245.67	4695.92	640.51	31.77	2574.15	-	362.31	-	220.72	1250.88	1181.79	287.62
AUG	11914.13	7198.94	681.58	81.60	2709.99	-	92.39	-	73.39	1076.24	-	-
SEPT	10686.33	4986.87	318.99	144.78	2890.09	1065.75	238.07	-	81.09	135.67	825.02	-
OCT	11874.88	4995.60	-	247.74	3553.35	1065.75	196.74	93.24	568.54	568.54	1153.72	-
NOV	12366.84	4759.69	-	72.45	3241.34	-	349.67	456.34	184.54	2487.92	748.14	66.75
DEC	19953.71	9492.88	-	211.03	5590.67	-	418.28	-	432.59	3808.26	-	-
TOTAL	137296.11	67859.00	1641.08	2142.20	33967.85	4263.00	3095.68	776.77	2782.97	16278.60	4134.59	354.37

*SUNDRY INCLUDES SLUDGE HAULING COSTS WHICH WERE $11,046.40

1968 OPERATING COSTS



TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	M.G.TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER LB OF BOD REMOVED
1966	717.1	$ 89,625.37	$124.99	5 cents
1967	1130.2	124,134.09	107.93	4 cents
1968	1380.4	137,296.11	99.46	4 cents

Process Data

The total gallonage treated in 1968 was 1380.4 mg compared to 1150.15 mg in 1967. The average daily flow for 1968 was 3.80 mgd which is 0.65 mgd higher than the 1967 value and represents approximately 84% of plant hydraulic capacity. The maximum day flow for the year, 15.60 million gallons, occurred in February and represents 350 percent of design capacity.

During the months of September and October, approximately 2 mgd of waste from the canning factories was admitted to the treatment plant. The rest was processed in the aerated lagoons. No waste was received from the Canadian and Dominion Sugar Company in 1968 as it closed operations early in the year.

From the probability graph, it can be seen that during 1968 the design hydraulic capacity of the plant was exceeded about 30% of the time.

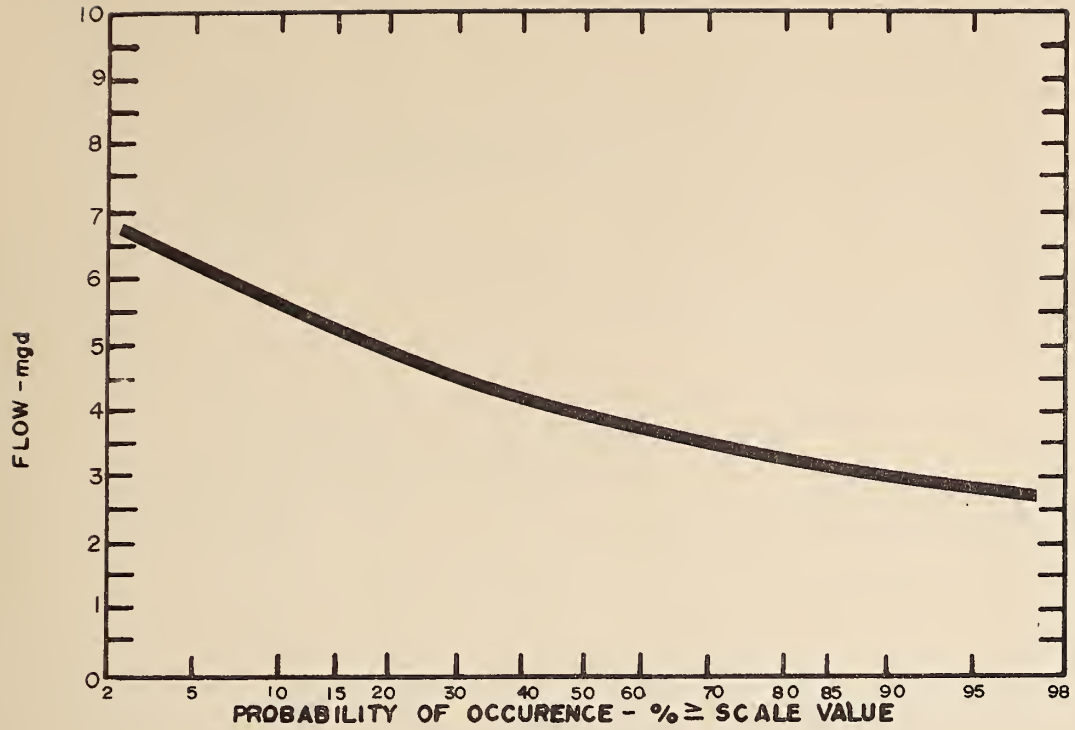
CHLORINATION

The final effluent was chlorinated throughout the year. An average of 5110 pounds of chlorine gas was required each month at an average dosage of 4.4 mg/l.

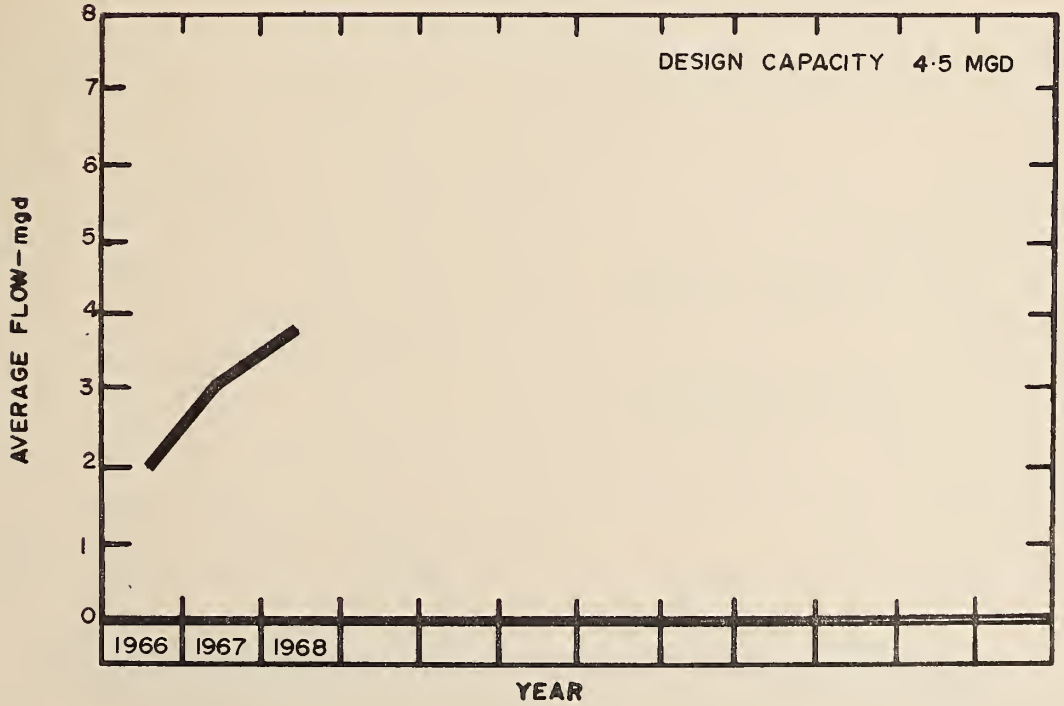
A considerable variation in dosage rate was required to maintain the chlorine residual at the desired level of 0.5 mg/l in the effluent for discharge to the Thames River. The highest dosage was required during the late spring and summer months.

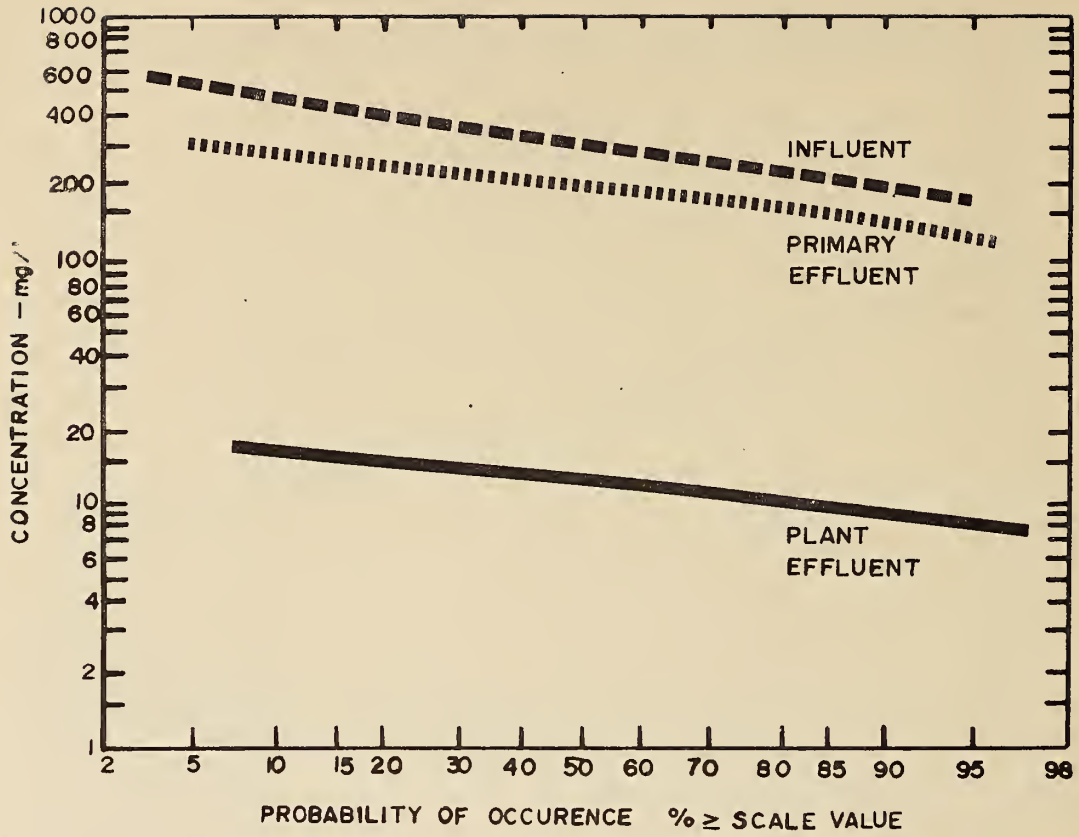
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mg	AVERAGE DAILY FLOW mg	MAXIMUM DAILY FLOW mg	MINIMUM DAILY FLOW mg	CHLORINE USED 10^3 lbs.	DOSAGE mg/l
JAN	106.8	3.45	5.90	1.70	2.58	2.4
FEB	109.0	3.76	15.60	.80	1.82	1.7
MAR	130.6	4.21.	5.70	2.50	2.85	2.2
APR	93.2	3.11	5.00	2.00	2.65	2.8
MAY	107.8	3.48	5.70	2.50	4.02	3.7
JUN	111.5	3.72	4.90	2.90	9.37	8.4
JUL	108.0	3.48	4.30	2.00	11.72	10.8
AUG	120.8	3.90	6.10	2.40	6.48	5.3
SEPT	137.2	4.57	7.10	2.10	7.68	5.6
OCT	116.0	3.74	5.50	3.40	7.64	6.6
NOV	110.0	3.67	6.80	2.60	2.61	2.4
DEC	129.5	4.17	6.10	2.80	1.96	1.5
TOTAL	1380.4	-	-	-	61.38	-
AVERAGE	-	3.80	-	-	5.11	4.4

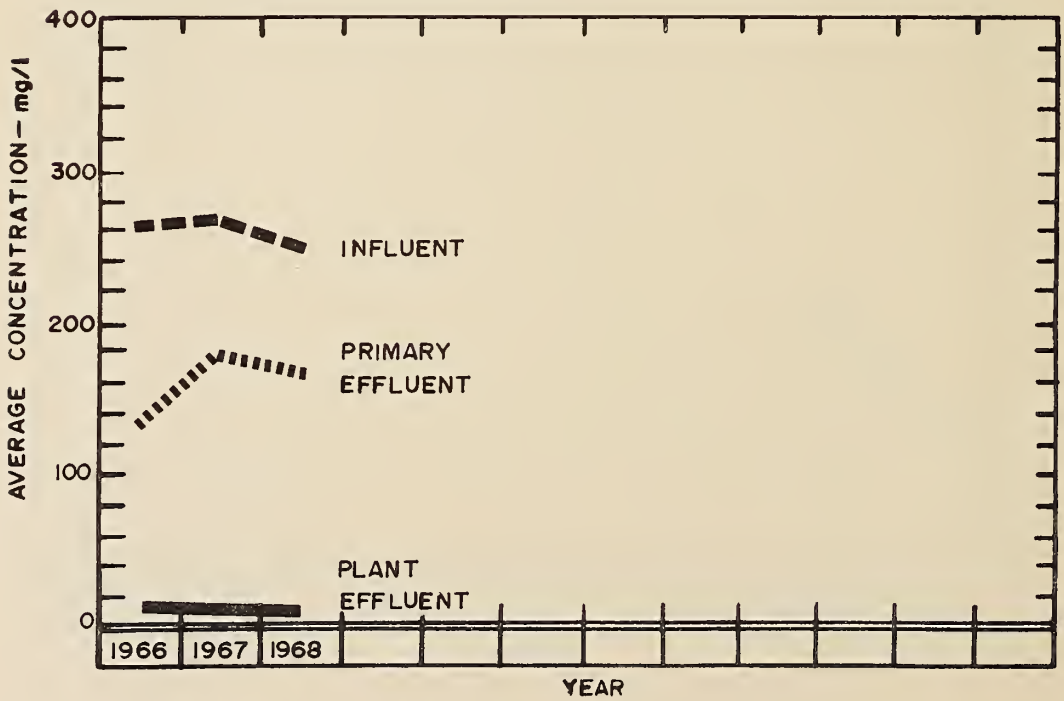

FLOW - mgd
0
1
2
3
4
5
6
7
8
9
10
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

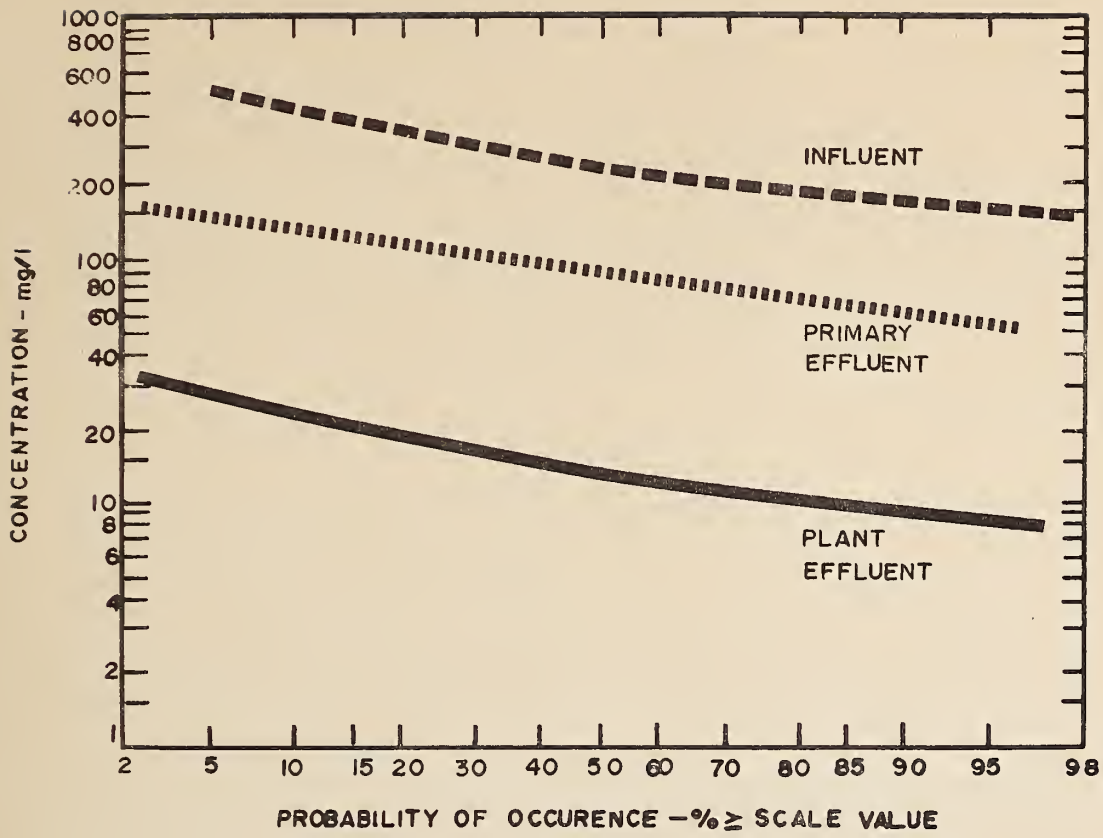
FLOWS


AVERAGE FLOW - mgd
0
1
2
3
4
5
6
7
8
DESIGN CAPACITY 4·5 MGD
1966
1967
1968
YEAR

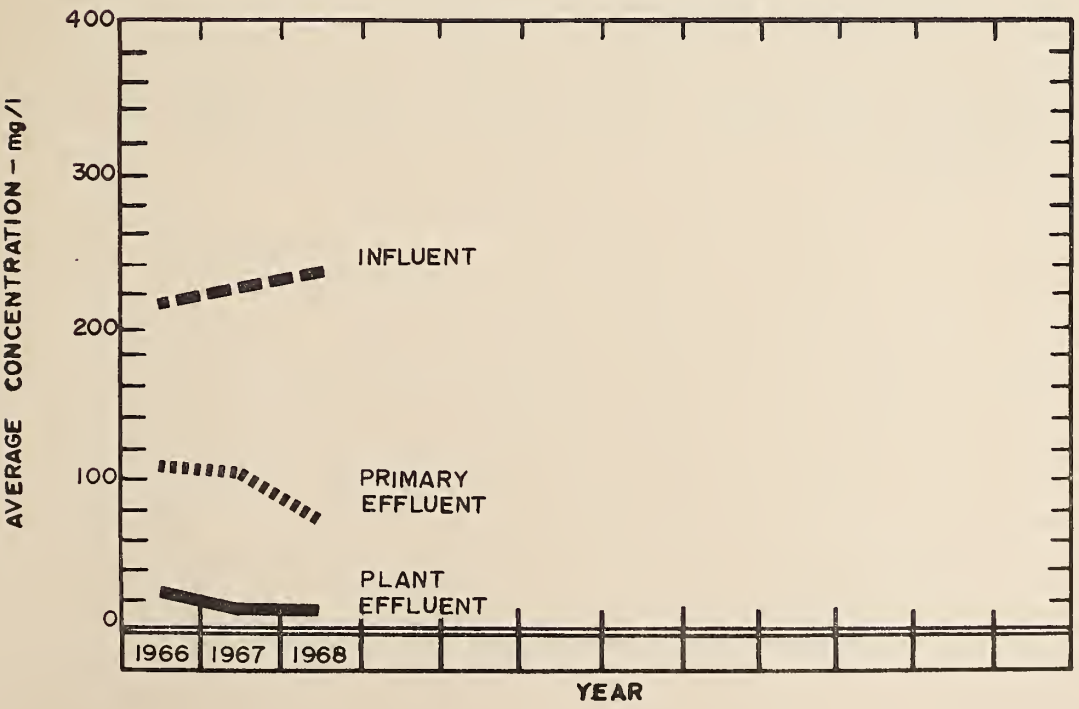


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT
	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^5 lb	INF CONC^N mg/l	EFF CONC^N mg/l	RED^N %	REMOVAL 10^5 lb	REMOVAL ft^3
JAN	303	17	94	3.05	205	17	92	2.02	295
FEB	138	9	94	0.54	166	11	93	1.69	64
MAR	274	11	96	3.44	207	13	94	2.53	118
APR	110	17	84	.87	250	15	94	2.19	47
MAY	341	16	95	3.50	309	19	94	3.13	279
JUN	318	10	97	3.43	279	10	96	3.00	208
JULY	318	-	-	-	230	10	96	2.30	389
AUG	-	14	-	-	253	11	96	2.92	309
SEPT	180	11	94	2.32	228	39	82	2.59	263
OCT	204	-	-	-	219	19	91	2.32	185
NOV	280	8	97	2.99	220	9	96	2.32	130
DEC	280	13	95	3.46	238	16	93	2.87	55
TOTAL	-	-	-	31.20	-	-	-	29.88	2342
AVERAGE	250	13	95	2.62	234	16	94	2.49	195

* Estimated

COMMENTS

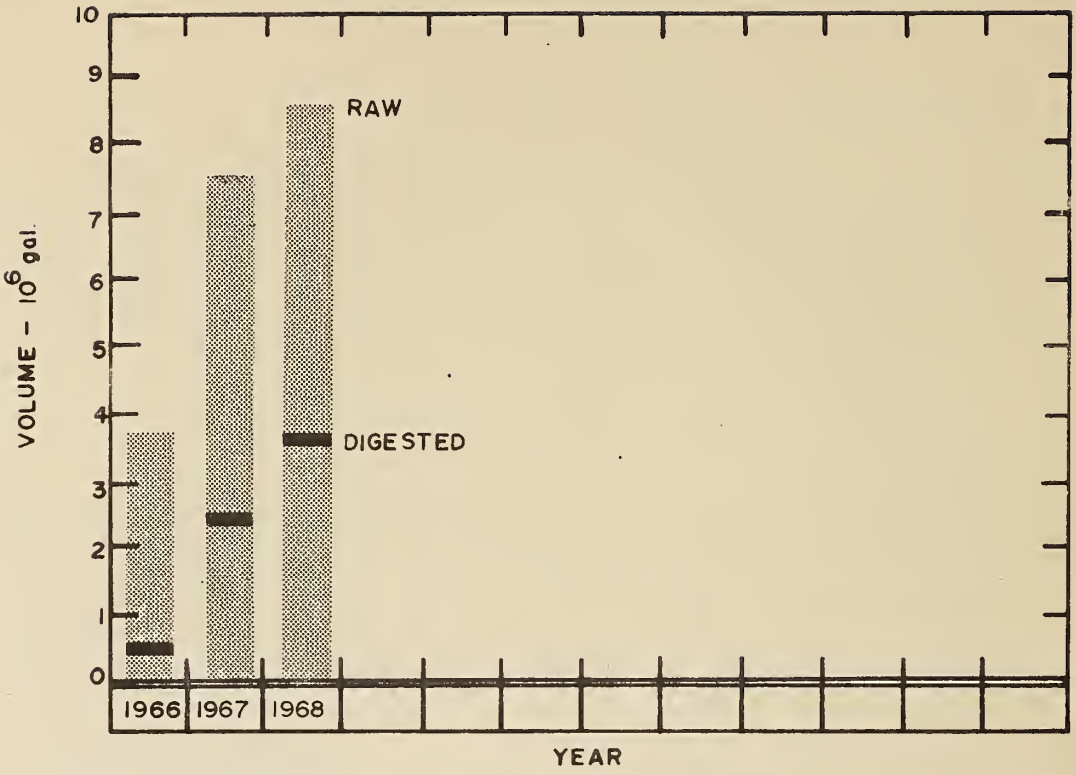
The average raw sewage strengths in 1968 were 250 mg/l BOD and 234 mg/l suspended solids. The average strengths of the final effluent were 13 mg/l BOD and 16 mg/l suspended solids and represent removal efficiencies of 95 and 94% respectively. The final effluent met the OWRC objectives of 15 mg/l for BOD 80% of the time, and for suspended solids 65% of the time. This is a great improvement over the 1967 results.

Approximately 3.120 million pounds of BOD and 2.988 million pounds of suspended solids were removed during the year.

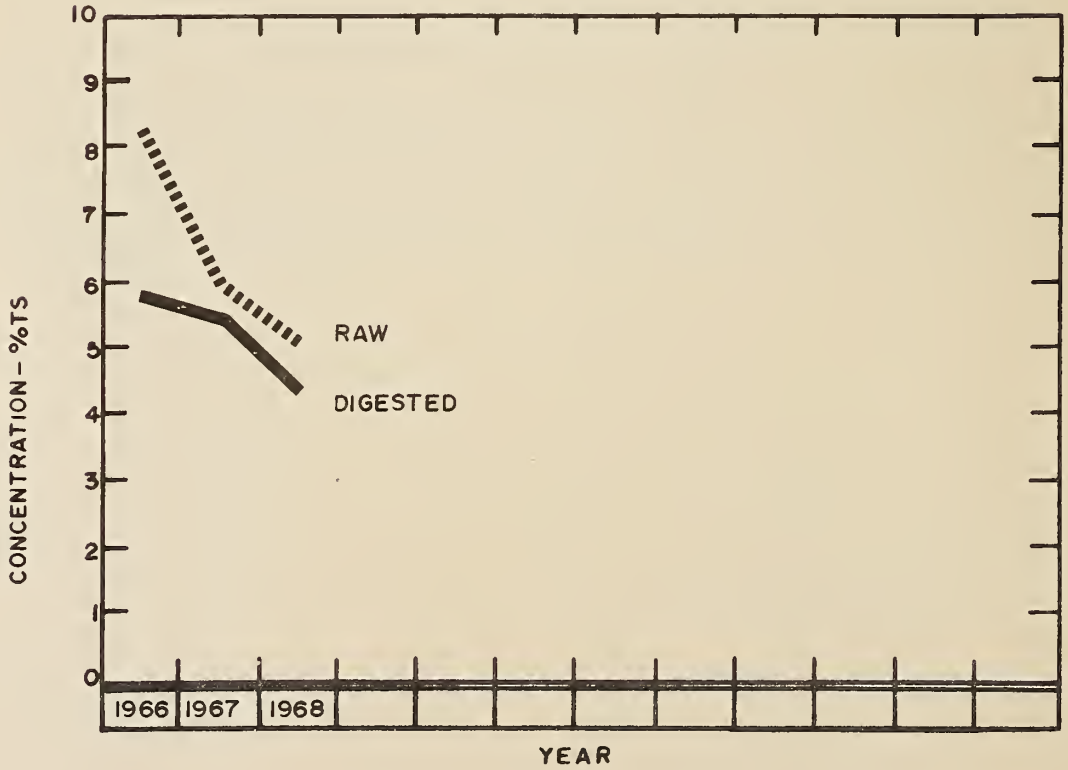
The primary effluent had an average strength of 163 mg/l BOD and 79 mg/l suspended solids, representing removals of 34.8% and 66% respectively in the primary section of the plant.

The above results are based on 8 and 16-hour composite samples taken at least twice a week except during the summer months, when a breakdown occurred in the plant incubator.

A total of 2342 cu. ft. of grit was removed. This represents a grit removal of 1.7 cu. ft. per million gallons of raw sewage, which is average. The high values of August, September and October are a result of the intensified food processing operations, and the "grit" is mostly organic, such as tomato seeds and beans.


VOLUME - 10^6 gal.
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1966
1967
1968
YEAR

DIGESTION


CONCENTRATION - %TS
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1966
1967
1968
YEAR

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME 10^5 gal	T. S. %	V.S. %	VOLUME gal	T. S. %	TANK TRUCK yd^3	DRYING BEDS 10^5 yd^3
JAN	6.90	4.7	54	3.86	5.3	40	-	-	2292	0
FEB	2.20	5.6	52	2.23	7.1	44	-	-	1324	0
MAR	7.60	4.8	56	2.26	4.8	42	-	-	1340	0
APR	6.91	5.1	52	2.36	5.9	38	-	-	1403	0
MAY	9.25	4.8	53	3.05	4.7	40	-	-	1810	0
JUN	8.34	4.2	58	2.88	4.2	42	-	-	1560	2.61
JUL	10.56	3.2	64	6.31	-	-	-	-	1515	6.70
AUG	7.64	3.3	62	2.58	-	-	-	-	1530	2.16
SEPT	6.58	3.3	62	1.28	-	-	-	-	702	1.03
OCT	7.17	3.9	60	3.33	4.9	42	-	-	1977	0
NOV	6.68	3.0	58	3.15	4.3	50	-	-	1868	0
DEC	6.68	5.7	51	2.60	5.0	50	-	-	1542	0
TOTAL	86.51	-	-	35.89	-	-	-	-	18893	12.50
AVERAGE	7.21	4.3	56	2.99	5.1	43	-	-	1574	-

COMMENTS

A total of 8,651,000 gallons of raw sludge was pumped to the digester and a total of 3,589,000 gallons of digested sludge was removed.

Most of the digested sludge was disposed of by tank truck. However, a total of 1,250,000 gallons of digested sludge was disposed of on plant property in drying beds.

AERATION

MONTH	AVERAGE FLOW mgd	PRIMARY EFF BOD CONC^N mg/l	PRIMARY EFF SS CONC^N mg/l	SECONDARY EFF BOD CONC^N mg/l	SECONDARY EFF SS CONC^N mg/l	MLSS CONC^N mg/l	F/M (lb BOD / lb MLSS)	AIR USED (1000 ft / lb BOD REMOVED)	WASTE SLUDGE 10^3 lb
JAN	3.45	195	123	17	17	1,560	.30	.94	-
FEB	3.76	99	78	9	11	1,170	.22	.90	-
MAR	4.21	116	77	11	13	970	.35	.74	-
APRIL	3.11	-	84	17	15	1,020	-	-	-
MAY	3.48	152	91	16	19	960	.39	.82	-
JUN	3.72	171	82	10	10	1,000	.44	.52	7.3
JUL	3.48	-	51	-	10	820	-	-	20.4
AUG	3.90	-	69	14	11	1,180	-	-	-
SEPT	4.57	195	65	11	39	800	.77	.47	16.2
OCT	3.74	-	75	-	19	740	-	-	10.0
NOV	3.67	188	63	8	9	1,040	.46	.48	2.7
DEC	4.17	189	83	13	16	1,100	.50	.26	31.1
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	3.80	163	79	13	16	1,030	.43	.64	*14.6

* 6 month data

COMMENTS

The average BOD to the aeration section was 163 mg/l and the average MLSS was 1030 mg/l, resulting in an average loading of 0.43 pounds of BOD per lb. of MLSS. An average of 640 cubic feet of air was supplied per pound of BOD removed.

CONCLUSIONS

The third full year of operation at the Chatham plant was very satisfactory in that process efficiencies were improved while unit costs were reduced. The continuing problem of variable pH shock loads again caused upset and by-passing on occasion. Bean odours have continued.

Two cells of the aerated lagoon were placed in operation during the year and handled a portion of the wastes from the tomato pack. The balance of the load was handled very well by the treatment plant. It is expected that the aerated lagoon will be in full operation in 1969.

RECOMMENDATIONS

It is recommende of the City's in-
dustrial waste by- educe industrial
waste problems w iency and water
quality in the Tha

ONTARIO WATER RESOURCES COMMISSION
DIVISION OF PLANT OPERATIONS.
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CHATHAM

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